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ABSTRACT

This paper describes a collection of novel ideas for bulletin board displays that would be useful in supplementing science classroom instruction. Information on women and minorities in science; science concepts in everyday activities such as nutrition, baseball, and ice cream-making; and various holidays and celebratory events is included. Each suggested bulletin board is accompanied by a written description and a reference list of print resources and web sites. Each display can be used to involve students in the actual creation of the bulletin boards. (Author/WRM)

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Science Squared: Teaching Science Visually

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Olga Paradis
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Science Squared: Teaching Science Visually

by Olga Paradis, Karen Savage, and Michelle Judice*

The year 2000...the dawn of a new millennium...the World Wide Web...a computer for everybody...online is the place to be...find your answers on the Internet...easy to use... Bulletin boards? Who needs them? Do bulletin boards still have a purpose in today's educational scene?

Teachers face blank bulletin boards each month with a special dread, especially beginning teachers, and nothing is worse than a blank bulletin board. In this article, the authors clearly demonstrate that the bulletin board still serves a purpose in today's classroom and can be merged with the latest technology, the World Wide Web. The article presents ideas/suggestions and actual bulletin board displays for teachers in the elementary, junior high, and high school environment. These bulletin boards eliminate that sinking feeling that accompanies teachers when faced with the dilemma of what to do with the bulletin board each month. Each display can be used to involve students in the actual creation of the bulletin boards.

Teaching science may be accomplished in a variety of methods, and each one of these bulletin boards can be used to supplement the traditional methods of teaching in today's classrooms. The topics are based on science/engineering/technology themes--chemistry, physics, biology, agriculture, food science, sports, health care, and nutrition, but are not necessarily limited to science teachers. Each one has been used in an actual university science library setting. For example, "July: National Ice Cream Month" combines thermal reaction and summer's favorite cool treat. November is the time for Thanksgiving, and the display presents our traditonal food items in a different way. In April, thoughts usually turn to baseball, but this display shows baseball with a slight "curve." Need a different way to spark an interest in physics? Show how physics is an integral part of baseball. Celebrate Columbus Day and still be politically correct with the October bulletin board, focusing on the positive effects of the Columbian Exchange. Present a different approach to President's Day by combining the study of presidents with National Engineering Week, also celebrated in February because two U.S. presidents were engineers. Use the March bulletin board, highlighting four distinctive American women, for Women's History Month.

By combining the use of bulletin board displays with the Web, teachers can link a new technology with a traditional classroom tool. Each bulletin board display used in this article is accompanied by a written description and a reference list of print resources and Web sites. The descriptions and references are included in this article. If a picture is worth a thousand words, then this article has more than twelve thousand "words" to linger in the minds and memories of students. The pictures may be viewed at this Web address: (**http://www.baylor.edu/~Olga_Paradis/**).

*The authors are currently employed in the Science/Engineering Department of Jones Library at Baylor University in Waco, Texas. The first author is the Head of the Science/Engineering Library. The second author is the Weekend Supervisor in the department and Head of the Spanish Department at Hillsboro High School. The third author provided much of the original art work for the article and served as a student assistant in the department for almost four years.
The authors also wish to acknowledge the assistance of Donna Etheridge, another member of the Science/Engineering Department at Baylor University, in the completion of this article.

If the web addresses cited in this article are no longer viable, please notify the author at the following e-mail address: Olga_Paradis@baylor.edu

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January: a potpourri

A variety of science themes take place during the first month of the year-- birthdays of scientists, first events, special days, special weeks, the beginning of a new semester, and, of course, Super Bowl Sunday. This display features a large calendar (bulletin-board size) with removable numbers for reuse and various pictures or drawings depicting the event, such as an empty, instant oatmeal package, a soup label, an individual tea package, a hot air balloon, an airplane, a pie, etc.

Good Health:
National Oatmeal Month--low-fat, salt-free, whole grain food that may help reduce risk of heart disease
National Hot Tea Month--to promote the only beverage served hot or cold anywhere, anytime for any occasion.
National Soup Month--to promote one of the world's favorite foods.
National Eye Care Month--to promote eyecare and prevent treatable diseases at the earliest stage.

Birthdays:
Ben Franklin--January 17, 1706. The original self-made American. Perhaps best-known for Poor Richard's Almanack, which he published for more than twenty years.
Winnie the Pooh Day (A.A. Milne birth anniversary)--January 18, 1882
Albert Schweitzer--January 14, 1875. Philosopher, musician, physician, and winner of the 1952 Nobel Peace Prize
Robert E. Lee--January 19, 1807. Son of Revolutionary War hero, General Henry Lee.
Martin Luther King, Jr.--January 15, 1929. Civil Rights leader, minister, and winner of the 1964 Nobel Peace Prize.
Edgar Allen Poe--January 19, 1809. American poet and story writer. Considered to be America's first mystery writer.
James Watt-- January 19, 1736. Scottish engineer and inventor of the steam engine.
Franklin Delano Roosevelt, January 30, 1882. 32nd President of the United States and the only one to be elected to more than two terms

Healthy Weight Week--the third week of the month and appropriate after the holidays. Offers a second chance at that blown New Year's resolution to begin losing weight.

Direct Deposit Week-to encourage people to use a "faster, safer, and smarter" means of receiving paychecks, by the New York Clearing House Corporation.

First Events
First hot air balloon flight over the English Channel, January 7, 1785
First Concord (supersonic) flight on January 21, 1976
Gold discovered in California on January 24, 1848
First scheduled transcontinental flight from California to New York, January 25, 1959
Coldest temperature recorded in Canada--62 degrees below zero on January 31, 1947
First voyage of nuclear-powered submarine on January 17, 1955

National Pie Day--January 23--it's O.K. to go off the diet for such a good cause, and it's only one day!
National Popcorn Day--January 25. Nothing is more American than popcorn. First eaten by Native Americans.
National Hugging Day-the "most huggable" people are announced annually on this day.
National Puzzle Day-to promote different types of puzzles and their creators
National Printing Ink Day--January 16. Where would the printed word be without ink?

Print References:
Chase's 1998 calendar of events. (1998). Chicago: NTC/Contemporary Publishing Company.

Web References:
http://www. healthywieght journal.com
http://www.ezpay.org
http://www.piecouncil. com

February: a joint celebration of National Engineers Week and President's Month

Almost two million people in the U.S. are engineers; yet for all the contributions they make to our daily lives, not many people understand what engineers really do. In 1951, the National Society of Professional Engineers established National Engineers Week, in an effort to help people understand what engineers do every day. Government agencies, national engineering societies, and corporations sponsor a multitude of programs designed to showcase engineers. The Draper Award, the "Nobel Prize" of engineering, is awarded each year during this week.

One of the many functions of engineers week is school-sponsored programs, focusing on the opportunities in mathematics and science that will lead today's students to promising careers as tomorrow's engineers.

The purpose of this bulletin board is to combine National Engineers Week and President's Month, because two U.S. presidents were engineers. The nation's first president, George Washington, worked as a surveyor in his early life. At the age of sixteen, he surveyed the Shenandoah area of western Virginia. Washington enjoyed numerous other careers in his life, gentleman farmer and planter, soldier, politician, representative to the Constitutional Convention and president. Washington later called for the establishment of an engineering school. This act led to the founding of West Point. For Washington's contributions to the field of engineering, National Engineers Week is always celebrated the week of February 22, Washington's birthday. Only one other president had the distinction of being an engineer, Herbert Hoover, who graduated from Stanford University and worked as a mining engineer in China before becoming president of the United States in 1928.

Three other presidents were born during the month of February-- Abraham Lincoln (February 14), William Henry Harrison (February 9), and Ronald Reagan (February 6) . Ronald Reagan served as president for eight years and won office each time with a large electoral majority over his opponents. As the sixteenth president, Lincoln's years in the White House witnessed the calamity of a civil war, the liberation of the slaves and the surrender of the Confederate forces. His assassination in April 1865 pre-empted a magnanimous peace process. As a soldier in the War of 1812, William Henry Harrison gained a national reputation and was nominated for president on the Whig ticket in 1840. After serving as president for less than a month, Harrison died, earning the distinction of being the first president to die in office.

The images used on the bulletin board for National Engineers Week show the various careers associated with the engineering profession--petroleum, electrical, civil, aerospace, construction, mechanical, mining, environmental, chemical, industrial, and bio-engineer.

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McGraw-Hill encyclopedia of science and technology, 7th ed. (1992). New York: McGraw-Hill.

Web References:
http://we.got.net/docent/soquel/prez.htm
http://historyoftheworld.com/pres/prezgen.htm
http://www.nae.edu (National Academy of Engineering)
http://www.swe.org (Society of Women Engineers)
http://www.eweek.org (the website for national engineers week with related activities)

March: National Women's History Month

In 1987, the Congress of the United States designated March as National Women's History Month. Many cities and states have opened a Women's Hall of Fame. Officials in other areas have provided biographical information on local prominent women. National Women's History Month has become a major celebration in many communities.

The four caricatures of American women in this display have been chosen to represent Women's History Month; each one exemplifies extraordinary contributions to this country through individual or group acts. Women have played unique roles throughout each phase of American history but have consistently been relegated to the shadows in terms of public recognition of their contributions.

Sacajawea, a young Shoshoni Indian woman, accompanied the Meriwether Lewis and William Clark expedition to the Pacific, 1804-06. She was the wife of T. Charbonneau, a French-Canadian, living in a Mandan village in North Dakota. She served as guide and interpreter on the trip. Sacajawea had been taken captive by a tribe of Minnetaree Indians and later sold or traded to Charbonneau. At the age of sixteen, she became mother to Jean Baptiste, who also traveled with the Lewis and Clark Expedition. Controversy surrounds the actual role that Sacajawea played on the expedition. Some accounts refer to her as a guide and interpreter. Other historians give her far less credit. One fact is indisputable--she suffered the same hardships of semi-starvation, difficult travel, and dangers as the men on the expedition. Since she was the only woman in the party, she undoubtedly gathered and cooked food, served as nurse and seamstress, as well as wife to Charbonneau , and mother to "Pomp," as Jean Baptiste was known. Her presence with her infant son testified to the peaceful nature of the party as they made their way through various Indian lands to the Pacific. More memorials exist today honoring Sacajawea than any other American woman.

Deborah Sampson, a young woman of twenty-two years of age from Middleborough, Massachusetts, disguised herself as a male and enlisted in the Continental Army in the 4th Massachusetts Regiment in May 1782. She served on active duty for a period of eighteen months under the pseudonym of Robert Shurtleff. She was wounded in battle at Tarrytown, but her identity was not discovered until she was later hospitalized with a fever. She was discharged in October 1783 and was the first woman to be placed on a pension list of the United States Government.

After World War I, women became more militant concerning equal rights. They organized, picketed and were frequently jailed for their efforts to gain the right to vote. Many women felt, for the first time, that they could and should control their own destinies. During World War I, they had held jobs that had been previously performed by men but returned to their traditional female roles after the war. The 19th Amendment, as approved by congress and the states in 1920, gave women the right to vote in state and national elections. World War II witnessed the return of women into the workforce in industrial and government jobs to replace the men who went to war. "Rosie the Riveter" became a national symbol of all the women who worked in factories and defense plants, held government positions, served in the non-combatant armed services or performed any traditionally male job. "Rosie the Riveter" was honored with a romanticized Saturday Evening Post cover in May 1943. The women who built tanks, planes, ships, munitions, and performed the countless other jobs that men had done helped to change public attitude about what women could do outside the home.

Dr. Mae Carol Jemison, chemical engineer, physician, teacher, scientist, and astronaut, was the first black female astronaut to go into space. In September 1992 she was Science Mission Specialist on board the Endeavor, after joining NASA in 1987. Prior to that, she was a General Practitioner in Los Angeles, an Area Peace Corps Medical Officer in Africa, a college freshman at sixteen, and the youngest of three children born in Alabama and raised in Illinois. After leaving NASA in 1993, Dr. Jemison joined the faculty of Dartmouth College, founded The Jemison Group, served as host and technical consultant of "World of Wonders," a series seen weekly on the Discovery Channel, delivered speeches at national and international organizations, received numerous awards and honorary degrees, served on numerous boards, has been inducted to several

She remains committed to full representation of gender, ethnic, and social diversity in science and technology careers in this country.

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Howard,H.P. (1971). Sacajawea. Norman, Oklahoma: University of Oklahoma Press.
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Claghorn, C.E. (1991). Women patriots of the American revolution. Metuchen, New Jersey: The Scarecrow Press, Inc.
Mann, H. (1972). The female review: The life of Deborah Sampson. New York: Arno Press.
Ingraham, C.L., and L.W. Ingraham. (1972). An album of women in American history. New York, Franklin Watts, Inc.
Swoboda, Alexis, P.E., (1996, March/April). Women of scientific achievement in the national women's hall of fame. SWE: Society of women engineers, 42, 8-12

Web References:
Nasa's Quest Web Site, Jemison Bio:
http://www.quest.arc.nasa.gov/women/TODTWD/jemison.bio.html
http://www.suite101.com/page.cfm/335
http://www.nwhp.org/month.html
http://www.nwhp.org/month.html#congres

April: The Physics of Baseball

Baseball: it's all about pitching, and the pitching is in the grip.

Curveball, sinker, slider, fastball, or any variation of these pitches. The grip determines what the ball does after it leaves the pitcher's hand. The different grips will produce "drag" or air friction on the ball. The spinning action as the ball is released causes the force of air friction to be different on each side of the ball, thus causing the ball to curve. The stitches on the ball also contribute to the curving of the ball. Each baseball has 108 stitches in it. Without those stitches, the ball would not curve. Even fastballs curve or "hop." A 95 mph fastball requires four-tenths of a second to reach homeplate, which is sixty feet, six inches from the pitcher's mound. The harder a ball is thrown, and the faster it moves, the greater the drag force. In order to make it to the major leagues, the pitcher has to hit a target (the catcher's glove) inside a box that measures 20" X 23"X 17."

How much will a curve ball curve?

The following equation demonstrates the Magnus Effect.

$F_{Magnus\ Force} = KwVC$,

where:

$F_{Magnus\ Force}$ is the Magnus Force
K is the Magnus Coefficient
w is the spin frequencey measured in rpm
V is the velocity of the ball in rpm
C is the drag coefficient

On the other side of the game, the batter waits for the pitch. The batter must start his swing when the ball is approximately twenty-five to thirty feet in front of home plate. The swing of the bat must also be positioned almost perfectly. A swing that is even slightly too high or too low becomes another out or foul ball. Batters who connect with the ball successfully on an average of three out of ten times are considered superhitters.

Bats, constructed from white ash wood, are made in Kentucky, home of the Louisville Slugger. The trees, native to New York and Pennsylvania, must be at least fifty years old. The wood is aged for six to eight months at a strict moisture level, and only the best quality is selected for major league team bats. Babe Ruth used a 42-44 ounce bat, while most sluggers today prefer a 33 ounce bat.

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Web References:
http://library.advanced.org {Search Dictionary (Baseball and Physics Dictionary)}
http://library.advanced.org/11902/cgi-bin/search.cgi
http://www.exploratorium.edu/baseball/
http://www.middleschool.com/virtual/classroom/lessons/sports/baseball.html

May: "The Golden Spike"

By the middle of the 19th century, the United States was a country of two coasts; settlements ranging along the eastern coast and along the western coast, with virtually nothing in the central part. The need for better transportation and communication linking the two coasts had reached a critical point. Freight companies, stage lines, the Pony Express, and the telegraph temporarily and partially answered the need for improvements in cross-country transportation and communication. Only the railroads, the high-tech companies of the 1800's, provided the definitive answer for linking the East and West. Prior to the Civil War, political differences had prevented the selection and location of a transcontinental railroad route. With the secession of the southern states and the beginning of the Civil War, Congress finally selected the principal route and chartered the first Pacific railroad in 1862. The Union Pacific Railroad would build westward from Omaha, Nebraska, and the Central Pacific would build eastward from Sacramento, California. Each company relied on government subsidies of land and loans, but the initial forty miles in each direction had to be financed by the individual companies. When the work progressed so slowly that only a few miles of track had been laid in the first two years, Congress passed an amendment to the first act. The 1864 amendment provided for more generous terms in land grants, second mortgages, and private investment. Building proceeded rapidly thereafter. The Union Pacific relied on imported labor from Europe and Ireland and Civil War veterans; the Central Pacific depended on labor from China. Work was hazardous for these 20,000 men who laid tracks through severe seasonal weather, dangerous mountains, deserts, and Indian attacks.

Five years later on May 10, 1869, the two railroads met in Utah territory at Promontory Point, close to Ogden. The Union Pacific had laid 1086 miles of track while the Central Pacific laid 689. The two railroads actually passed one another and laid miles of parallel track before Congress intervened and forced the railroads to meet at a designated site. When the cowcatchers of Engine 119 for the Union Pacific and the Jupiter from the Central Pacific touched and laborers hammered the last real spike into the tie, a giant celebration was held at the site in Utah, including the hammering of the special "golden spike." By the end of the 1800's, four more transcontinental railroads linked the nation. All except one received some form of government assistance. Less than thirty-five years later, both engines which took part in the great celebration had been scrapped for iron. By 1904, construction of a cutoff detoured the rail traffic around the famed site, and during World War II, the rails were removed and melted for the war effort. Only the golden spike itself has been preserved from the momentous occasion in 1869. In 1965, however, Congress acted to create the Golden Spike National Historical Site. The National Park Service has recreated railroad grades, track, telegraph lines, switches, and side connections to give an authentic appearance to the park. Two replica steam locomotives were built with federal funds and donated to the site. To see the once-famous site of the meeting of the first transcontinental railroad, visit http://www. mindspring.com/~jjlanham/today.htm

Print References:
Billington, R.A., (1974), Westward expansion: A History of the American Frontier, 4th ed. New York: Macmillan.
Hicks, J.D., et al. (1965). The American nation, 4th ed. Boston: Houghton Mifflin.

Web References:
http://www. mindspring.com/~jjlanham/today.htm (for a look at the1869 site as it is today)
http://www.media.utah.edu/medsol/UCME/g/GOLDENSPIKE.htm
http://www.utahonline.sltrib.com/96/May 13/tci/03045630.htm

June: The National "5 A Day for Better Health" Plan

The 5 A Day marketing program aimed at encouraging American children and adults to improve their diets began in 1991. Statistics from the US Department of Agriculture's Continuing Surveys of Food Intake by Individuals show that more of us are changing our diets for the better. But we have not yet reached the minimum 5 A Day servings recommended by health officials. In 1994, most adult Americans ate only 4.4 servings of fruits and vegetables every day. Children only consumed 3.4 daily servings of fruits and vegetables. All of us must improve our efforts to correct our children's eating habits.

The 5 A Day program is a joint effort between the National Cancer Institute (NCI) and the Produce for Better Health Foundation (PBH). The goal of the partnership is ultimately to increase intake to nine servings a day. The educational effort is to teach Americans to increase their daily intake the easy way through practical tips and recipes. PBH, licensed by NCI, works with grocery retailers, growers, shippers, foodservice operators, packagers, trade associations, commodity boards, and merchandisers to promote the 5 A Day campaign.

Eating 5 a Day requires only a little retraining on our part. Five A Day servings may come from fresh, frozen, canned, or dried fruits and vegetables. A serving is much smaller than most of us think--3/4 cup of juice, 1/2 cup of raw or cooked vegetables, 1/4 cup dried fruit, 1/2 cup cooked or canned peas or beans, 1 cup raw, leafy vegetables, or one medium fruit. Health studies have shown that many cancer-related deaths may have been caused by inadequate diets, such as insufficient servings of fruits and vegetables. A well-balanced diet helps us look and feel better. With the wide variety of fruits and vegetables available to us, we have no excuse for failing to eat a well-balanced diet and encouraging our children to develop sound eating habits. One way to correct bad-eating habits is to change what we purchase at the grocery store. Stop buying snack foods that are high in fat, cholesterol, or sodium content. Buy fruits and vegetables instead.

WE DARE YOU---Take the 5 A Day Challenge sponsored by the National Cancer Institute and Produce for Better Health Foundation. Dare to change your eating habits for the better. Begin Now--

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Ensminger, A.H., et al. (1995). The concise encyclopedia of food & nutrition. Boca Raton, Florida: CRC Press.
Tillotson, James E.,ed. (1993). America's food health messges and claims. Boca Raton, Florida: CRC Press.
Meiselman, H.L.,ed. (1996). Food choice, acceptance, and consumption. London: Blackie Academic & Professional.

Web References:
Web Resources for easy recipes and other tips for 5 A Day:
http://www.dcpc.nci.nih.gov/5aday
http://www.dole5aday.com
Miscellaneous websites for nutrition
http://www.shapeup.org/sua
http://www.faseb.org/asns

July: National Ice Cream Month

Never has a national event more been more enjoyable to celebrate. Americans love ice cream, at the rate of fifteen quarts per person per year. Americans ate ice cream for the first time in this country in the 1600's. The dessert had a slightly different name then, iced cream, with the more familiar name of ice cream occurring later. The first ice cream parlor opened in New York City in 1846, and five years later the first wholesale ice cream business opened in Baltimore.
Vanilla is the most popular flavor, followed by chocolate, butter pecan, strawberry, neapolitan, chocolate chip, French vanilla, cookies and cream, vanilla fudge ripple and praline pecan, according to the International Ice Cream Association in Washington, D.C.

Fun ice cream "facts"

According to one legend, the Chinese are credited with making the first ice cream in 200 B.C., with a mixture of snow, ice, and rice. Marco Polo took the recipe for ice cream to Europe from the Orient in the 13th century.

Another legend credits a chef of England's Charles I with the concoction.
Dolly Madison served ice cream at her husband's Presidential Inaugural Ball in 1813.

Whatever flavor your taste may crave, eat ice cream, and eat it often. Quickly, before the thermal reaction occurs, as the bulletin board depicts.

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Funderburg, A., (1996). Chocoloate, strawberry, and vanilla: A history of american ice cream. Bowling Green state University Popular Press.
Liddell,C. and R.Weir. (1993). Ices: The definitive guide. Hodder & Stoughton.

Web References:
http://www.oac.uoguelph.ca/foodsci

August: National Foot Care Month

"Get in step, get a foot in the door, stand on your own two feet, best foot forward, my aching feet" are just some of the common expressions associated with feet. The fact is that our feet bear the brunt of every day activities--walking, climbing, running, driving, standing, and exercising. The foot is subjected to five million pounds of pressure every day. Yet, most of us ignore our feet, take them for granted, or generally mistreat them. Feet are supposed to hurt at the end of the day, aren't they? Most people have foot problems of one type or another, but many of us are reluctant to seek medical assistance because we do not want to remove our shoes, often feeling embarrassed about our feet.

Many problems associated with foot pain are caused by the shoes we wear, the size, and/or the style. Our shoes are as revealing about our personalities as our clothes or hair style. Shoe fashion has experienced many changes throughout history--high heels, low heels, pointy-toes, round toes. These styles reflect not only the current fad but also the economy. A booming economy means high heels and pointy-toes; conservative economy means round toes and low heels. Men have also succumbed to high heels at various times throughout history. Consider the Yankee Doodle "dandy" in our history. These American dandies considered high heels to be chic. There are seven basic shoe types: the moccasin, sandal, mule, boot, monk, pump, and oxford. The more than thirty thousand shoe styles which flood the American market each year are derivatives of these basic styles.

Leather is the best material for shoes, but it is also the most expensive. Leather breathes, which allows perspiration to exit the shoe. The fact is true for socks, as well. Natural fibers allow moisture from perspiration to evaporate. However, white socks are not more sterile than colored socks, as many people believe.

To test your knowledge of shoe "smarts," take this abbreviated shoe-buying I.Q test*.:

1. When should one buy a new pair of shoes?
   A. early morning
   B. end of day
   C. anytime

2. Shoe should be flexible
   A. in the back
   B. in the front
   C. everywhere

3. For most people, the heel height of a good walking shoe is:
   A. three inches
   B. a flat shoe
   C. one to two inches

4. Ordering shoes from a mail-order catalog is:
   A. recommended only if you are certain of your shoe size
   B. recommended only if you send a tracing of your foot
   C. never recommended

Remember to be kind to your feet all the time. Wear the shoe size that fits your foot comfortably and put comfort above style when buying new shoes.
*Answers: 1. B 2. B 3. C 4. C

Print References:
Indian Health Services Program. (1997). Taking care of your feet. Albuquerque, New Mexico: IHS.
American Podiatry Association. (1982). Foot care for older people. Washington, D.C.:APS.
National Institutes of Health. (1982). Aging and foot problems. Bethesda, Maryland.:NIH.

Web References:
http://www.foothealth.com

September: National Hispanic Heritage Month

Miguel Servet (1511-1553), Spain

A man of multiple skills and talents, Servet studied law, theology, mathematics, astronomy, and geography. He tried to influence John Calvin's theological views by publishing his masterwork Christianism Recovered in 1553. Calvin's enemies imprisoned him, accused him of heresy, and burned him at the stake. His work in anatomy and physiology led him to the discovery of the circulation of blood through the human body. His work gave him a prominent place in the history of science.

Cesar Milstein (1927-) Argentina, Nobel Prize for Medicine and Physiology, 1980

Milstein shared the Nobel Prize for pioneering contributions to the theory and techniques of immunology, which were said to lay the basis for advances in medical areas such as cancer treatment and the detection of acquired immune deficiency syndrome (AIDS). In work with his co-laureate, Georges J.F. Koehler, Milstein developed the techniques for producing monoclonal antibodies, antibodies with a specific affinity for certain sites in the body, that might find diseased cells but leave healthy cells intact.

Ellen Ochoa (1959-) United States

NASA selected Ochoa as the first Hispanic female astronaut in 1990, and she trained at the Johnson Space Center in Houston. Ochoa graduated from San Diego State University before receiving her master's and Ph.D. degrees in electrical engineering from Stanford. Before her selection as an astronaut, she served as Chief of the Intelligent System Technology Branch at the NASA/AMES Research Center. Ochoa's dream is to build a space station which she says is "critical...to human exploration in space, a transportation mode to new frontiers." In the meantime, she is opening frontiers for Hispanics and women.

Severo Ochoa de Albornoz (1905-1993) Spain, Nobel Prize in Medicine and Physiology, 1959

Ochoa shared the Nobel Prize for his "contributions to the discovery of the mechanisms in the biological synthesis of ribonucleic acid and deoxyribonucleic acid." His research on high-energy phosphates and their role in the human body's energy process resulted in the discovery and application of the enzyme polynucleotyde phosphlirase, which catalyses the synthesis of RNA.

Bernado Houssay (1887-1971) Argentina, Nobel Prize for Medicine and Physiology, 1917

As a scientist and activist, Houssay received the Nobel Prize for "his discovery of the part played by the hormone of the anterior pituitary lobe in the metabolism of sugars." Although Houssay's major interest was in the endocrine glands and the pituitary, his research produced significant results on the physiology of circulation and respiration, the process of immunity, the nervous system, digestion, and snake and spider venoms. As an activist leader, he worked for the promotion of democracy, education, and scientific research in Argentina.

Luis Federico Leloir (1906-) Argentina

Leloir received the Nobel Prize for "his discovery of sugar nucleotides and their role in the biosynthesis of carbohydrates." Leloir, working in simple circumstances, isolated uridine diphosphate glucose and showed that it was incorporated into glycogen in the presence of a liver enzyme. He also worked out the mechanism of synthesis of starch. Leloir's discoveries--that the sugar nucleotides are principal actors in the interconvention of sugars and polysaccharide formation--led to additional research in carbohydrate metabolism and on the medical implications of the discoveries.

Narciso Monturiol (1819-1885) Spain

A Spanish physicist and inventor, Monturiol, a Catalonian, researched the first underwater navigation, and, in 1859, drove the first fully operable submarine in the world, the Ictineo.

Carlos Finlay (1833-1915) Cuba

Finlay became famous for his work in identifying the mosquito as a carrier of the deadly yellow fever germ. He recommended controlling yellow fever by controlling the mosquito population. His work, carried out in the 1860's, came to prominence in 1900.

Santiago Ramon y Cajal (1852-1934) Spain, Nobel Prize in Medicine and Physiology, 1906

Ramon y Cajal received the Nobel Prize for his work on the structure of the nervous system. His major contributions were in adapting Golgi's silver nitrate staining techniques to thick sections of embryonic material, in formulating theories of nervous system structure and nerve impulse transmission, and in explaining the areas of traumatic degeneration and regeneration of nervous structures. He was also a notable author and Spanish statesman, always concerned about the status of Spain and the Spanish language.

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October: Celebrating the Columbian Exchange

This display focuses on the biological, economic, and cultural exchanges that occurred as a legacy of Christopher Columbus's arrival in the New World. Manifestations of the beneficial and detrimental effects that occured as a result of the collision of the two worlds became apparent almost immediately. The American Indian had lived in isolation for thousands of years before the arrival of the Europeans; an isolation in which he had no opportunity to develop any resistance to diseases or to develop a sophisticated civilization with advanced metallurgy or other technology to aid in his defense against the conquistadors.

The biological exchange of plants and animals also began immediately. On both sides of the Atlantic, food and/or animals were grown or raised in areas that had not previously supported any form of life. Wheat was introduced to the New World primarily because the Europeans did not like maize or maize products. The Europeans deliberately introduced to the New World those foodstuffs with which they were familiar, often disdaining the plants and foods native to the New World. The Indians had the same distaste for Old World foods, preferring their own. Gradually, however, these preferences faded, with Old World and New World products blending to create new foods and improving the diet for Europeans and Indians. Food crops from the New World, such as maize, potatoes, beans, and squash were gradually introduced into many other parts of the world and have been providing primary or secondary food sources since the early sixteenth century. New World food products have substantially enriched the lives of all the inhabitants of this planet. With an improved diet and economy, the population of the world doubled between 1650 and 1850.

Domesticated animals brought from the Old World reproduced in great numbers and provided food, hides, and tallow while also serving as beasts of burden and transportation. These animals were also the basis for new industries with cattle ranching and sheep herding. The horse was partially responsible for the early and easy defeat of the Indian nations in Mexico and South America, but certain tribes of North American Indians eventually became adept horsemen and proved to be able opponents of the U.S. Army until well into the nineteenth century.

Certainly, the vast amounts of silver and gold that were transported to Europe influenced the commercial classes, leading to the creation of a world market for certain goods for the first time with several European cities as the center of trade. Manufactured goods, raw materials, and human labor were traded internationally, which, in turn, led to an increased demand for transportation.

While tobacco was controversial in Europe from the time of its arrival, a strong demand for the product led to the creation of plantations in the New World, and a major economic industry developed around the growing and exporting of tobacco. Early Europeans viewed tobacco as either a curative for all ills or as socially and morally unacceptable.

The Columbian Exchange has been a constant source of change throughout the world since 1492 and will continue to affect humankind. The greatest exchange has undoubtedly been in the form of human beings, who came to this country voluntarily or involuntarily. The migration of people flowed from all directions, creating the melting pot of cultural, religious, racial, and linguistic forces that has shaped the New World for more than 500 years.

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November: Meet Us Before You Eat Us

The U.S. is the leading producer of turkeys in the world and is also the leading consumer of poultry meat in the world with a per capita consumption of 91.9 lbs per year. Poultry meat contains more quality protein and is lower in fat than beef and pork and is also a good source of phosphorus, iron, copper, zinc, vitamin B-12, B-6, and other vitamins and minerals (niacin, riboflavin, thiamin.)

Pumpkin's (cucurbita maxima) ancestors originated in Guatemala and Mexico, where they have been cultivated for approximately 9,000 years. Not only the pulp of this gourd or melon family is edible but also the seeds and flowers. Different varieties of this family also include squash and cucumbers. The pumpkin is over 90% water and is an excellent source of Vitamin A. The pumpkin flower may be dipped in batter and deep-fried or served in a salad, soup, or stew. The seeds are high in calories, but provide abundant protein, iron, and phosphorus and are extremely tasty when seasoned and roasted.

Squashes (cucurbita pepo)provide edible seeds, pulp, and flowers, like the pumpkin. They first appeared around 8,000 B.C., and the seeds provided a valuable food source. From Central America, varieties of squash spread to North and South America.

Beans (leguminosae), wild and cultivated, are indigenous to Central America and were first cultivated 7,000 years ago. The cultivation of beans spread to North and South America, and Spanish explorers later transported them to Europe. More than 100 varieties of beans exist and are among the healthiest vegetables consumed by humans. Wisconsin is the leading producer of green beans in the U.S. Beans contain valuable amounts of protein, Vitamins A, B, and C and serve as a substitute for meat.

Corn or maize (Zea mays) is a plant of the grass family and is used to describe the particular plant in the U.S. while the word maize is used internationally because in other parts of the world, it refers to wheat and/or oats. Corn is native to the Americas. Fossilized corn pollen (approximately 80,000 years old) has been found in soil studies near Mexico City. Ears of corn (approximately 3,000 years old) have also been found in Mexico. Indians from Canada to Chile raised corn with a variety of colored kernels. Corn is the leading U.S. cereal grain, with Iowa the leading corn-producing state. Corn, the third most important human food after rice and wheat, is nutritious but lacks quantity and quality of protein. When supplemented with beans and other nutritious foods, corn becomes an excellent energy food.

The cranberry(vaccinium) is native to the bogs and marshes of the northern U.S. and was first cultivated in Massachusetts. The cranberry is a relative of non-edible plants such as the azalea, mountain laurel, and rhododendron. Cranberries remain mostly indigenous to the U.S., being relatively unknown outside this country. The leading cranberry producing state is Wisconsin. Raw cranberries are low in calories and carbohydrates, a good source of fiber and bioflavonoids, and a fairly good source of potassium and vitamin C.

The potato (solanum tuberosum), the fourth major food after wheat, rice, and corn, is the leading vegetable crop of the world. It is native to South America and was first cultivated 4,000-7,000 years ago. The potato is a member of the nightshade family, as are the tomato, red pepper, tobacco plant, and eggplant. However, the potato is NOT related to the sweet potato or yam. Potatoes contain protein, phosphorus, iron and vitamin C but small amounts of calcium and vitamin A.

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http://www.nmnh.si.edu/garden

December: Snow Fun and Facts

December is the season to think of snowflakes and snowmen, cozy fireplaces, hot chocolate, and sledding, snow-covered trees misplaced gloves, boots mittens coats and...
But, in science, the thought of snowflakes brings a more fundamental question----

How are snowflakes formed, and is it true that no two are alike?

Snowflakes are formed when a hexagonal crystal forms from water molecules in the clouds. The oxygen and hydrogen molecules are attracted to each other and form a polycrystal, or many, individual frozen molecular crystals. Then several polycrystals combine to form a snowflake. As the snowflake falls through the atmosphere, its shape changes dramatically. The flake continues to change, reshape, and reform itself until it descends to earth, coming to rest on a snowy field, a sidewalk, the windshield of a car, or your frozen nose. Snowflakes take on almost any shape at this point, a star, a diamond, a flower, or a lace doilie. Since no two crystal particles follow the same path through the atmosphere, no two snowflakes are alike.

Why is snow white?

Snow looks white because it reflects almost all sunlight. The small amount of light that is not reflected penetrates the snow evenly and is scattered across the ice grains. The reflected light appears white to the observer.

Which city(cities) receive the most snow?

According to the National Snow and Ice Data Center, predicting a snowstorm is still difficult in spite of the technological advances in radar and other equipment used by weather forecasters. The two snowiest U.S. cities are located in New York state, Rochester and Buffalo. Rochester has an annual snow-removal budget of $3.7 million. Almost every place in the U.S. has experienced snowfall, including southern Florida. Phoenix, Arizona, received two snowfalls of one-inch each time, one on January 20, 1933, and again, four years later, on the same date.

Is it ever too cold to snow?

Snow can fall in the coldest temperature, as long as there is moisture and a way to lift and cool the air.

Is snow a good insulator?

Freshly-fallen snow makes an ideal insulation, equivalent to a R-18 value of insulating materials. Air becomes trapped in the snow crystals and thus heat transfer is limited. Fresh, uncompacted can be as much as 90-95% trapped air.

Snow Terms:

blizzard--heavy snowfall accompanied by at least 35mph winds with visibility reduced to less than 1/4 mile for a duration of at least three hours

snowboard--a flat, white, solid material that is placed on the ground or on the snow, measuring at least two feet on each side to obtain more precise measurements of snow and water

snowburst--intense snowfalls of short duration with restricted visibility and rapid accumulation

snow flurries --snowfall of short duration with frequent changes in intensity and little or no accumulation

snow squall--brief, intense snowfall with restricted visibility and accompanied by strong winds

To find out how much snow falls in a particular area, try this Website: http://www.ncdc.noaa.gov

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Additional bulletin boards:

...Are you a sinkie? Never heard the term? Sinkies are those people who occasionally eat over the kitchen sink. Hence, the term, sinkie. Celebrated annually the day after Thanksgiving, Sinkie Day is the perfect day for eating over the kitchen sink, the ideal way to use the leftovers from the big feast. Norm Hankoff formed the International Association of People Who Dine over the Kitchen Sink in 1991. His purpose was to enable sinkies to eat their meals over the kitchen sink without feeling guilty. Later, he was the author of The Sinkies Don't Cook Book. In honor of Sinkie Day each year, a list of "suspected" sinkies is announced. To date, there are over 1000 members of the association, but there are millions more who remain in the closet, ashamed to admit that they, too, are sinkies at heart and in practice. The Web site lists the top ten ways to spot a closet sinkie and includes a list of famous sinkies.

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National Chemistry Week

"A Chemistry degree...Now What?" The first week in November is National Chemistry Week, an ideal time for a bulletin board display that shows the variety of careers available to someone with a chemistry degree. "Not all chemists wear white coats" is the slogan on the poster from The Royal Society of Chemistry in England. Chemists can work in the fields of law, foresenics, marketing, sales, food, electronics, pharmacology, as well as research or education. Invite chemists who work in non-traditional fields to speak to the class about their work experiences. Have students research famous chemists to display on the bulletin board.

Science Is...

A humorous look at answers given on actual science tests by students in primary, junior high, and high schools across the country... they were compiled by science and health teachers.

H20 is hot water; C02 is cold water.
When you smell an odorless gas, it is probably carbon monoxide.
Blood flows down one leg and up the other.
Magnet: Something you can find crawling all over a dead cat.
Vacuum: a large, empty dead space where the pope lives.
To remove dust from the eye, pull the eyelid down over the nose.
Water is composed of two gins, oxygin and hydrogin: Oxygin is pure gin. Hydrogin is water and gin.
The three kinds of blood vessels are arteries, vanes, and caterpillars.
The pistol of a flower is its only protection against insects.
To keep milk from turning sour, keep it in the cow.
The moon is a planet just like earth--only it is even deader.

May is...

A second option for a May bulletin board is to promote humane treatment of animals with "Be Kind to Animals Week."

May: "Do you know me?"*

"Be Kind to Animals Week" is celebrated the first full week in May. This bulletin board display combines the emphasis of humane treatment of animals with the identification of animals though their tracks, as might have been done by trappers, woodsmen, Indians, etc. in this country many years ago, as well as hunters and trackers today. Paw prints of twenty-five different animals were used, glued to pieces of colored construction paper. A contest could be held to see which students know (or guess) the highest

number of animal tracks. First, display the tracks on the bulletin board without benefit of the names; then provide examples of many different animal tracks and allow the students to identify them on the board with the assistance of the examples. When everyone has had an opportunity to identify the tracks, then read the correct names of the animals.*

Another way to involve students in this display is to suggest that they make a track collection. Stage a contest to see which student(s) can find and identify the highest number of animal tracks. Students can make a plaster cast, silhouette or take a photograph of each track found. Modeling clay can be used to make the plaster cast. This display could be linked to a study of endangered species the students' favorite animals or a trip to the local zoo and a study of the animals seen there.

Interesting facts on some of the animals can also be used in the display. For example, the moose is North America's largest game animal and the largest member of the deer family. The caribou is the only member of the deer family in which both males and females have antlers. The prairie dog is a member of the squirrel family and is found only in the New World. The gestation period for the opossum is 12 1/2 days! The name raccoon is derived from the Algonquin Indian word, arakun, meaning "he scratches with his hands." Animals that walk flatfooted ordinarily have larger hind feet than front feet. Bears, squirrels, and rabbits fit into this category. Most flat-footed animals have four toes on their front feet and five toes on their hind feet. Patterns of tracks can be made to show how the tracks would look if the animal were trotting or running.

Among the tracks used in the display were the coyote, woodchuck, skunk, domestic cat, rabbit, caribou, bison, weasel, duck, antelope, dinosaur, mountain goat, elk, crow, mink, otter, beaver, squirrel, tiger cub, hyena, mountain lion, dog, wolf, raccoon, leopard and tiger.

*The names of the animals are written underneath each paw print.

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